MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

DCT5038 – DATA COMMUNICATIONS AND NETWORKING

(DIT & DBIS)

21 OCTOBER 2019
2:30 p.m. – 4:30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT:

1. This question paper consists of **THREE (3)** pages.
2. There are **FIVE (5)** structured questions in this paper. Each question carries total of **10 Marks**.
3. Answer **ALL** questions in the **Answer Booklet** provided.

Structured Questions [50 marks]

*Instruction: Write your answers in the **Answer Booklet.***

Question 1

a) Draw a hybrid topology where two star networks and one mesh network are attached separately to a ring backbone.

(4 marks)

b) Briefly describe **ONE** function for the following layer in the OSI model:

i. Session layer (1 mark)
ii. Presentation layer (1 mark)

c) Given the following frequencies, calculate the corresponding periods and write your answer in seconds:

i. 8 kHz (1 mark)
ii. 0.004 MHz (1 mark)

d) A signal travels from point A to point B through a transmission medium. At point A, the signal power is 100W. At point B, the power is 280W. Calculate its amplification in decibels. Write your answer to two decimal places.

(1 mark)

e) List **TWO** types of noise that may corrupt a signal.

(1 mark)

[TOTAL 10 MARKS]

Question 2

a) In a digitized signal, the interval between two samples is 0.25ms. Calculate for the following questions:

i. Sampling rate (1 mark)
ii. Bit rate if there are 3 bits per sample. (1 mark)

b) Briefly explain **THREE** characteristics of parallel transmission.

(3 marks)

c) ***Figure 1*** shows a time domain for a 4-PSK signal. Based on the ***Figure 1,*** answer the following questions:

i. Calculate the baud rate if the bit rate of the network is 9000 bps. (1 mark)
ii. Draw the equivalent constellation diagram based on the signal given in ***Figure 1*** with amplitude of 3. (4 marks)

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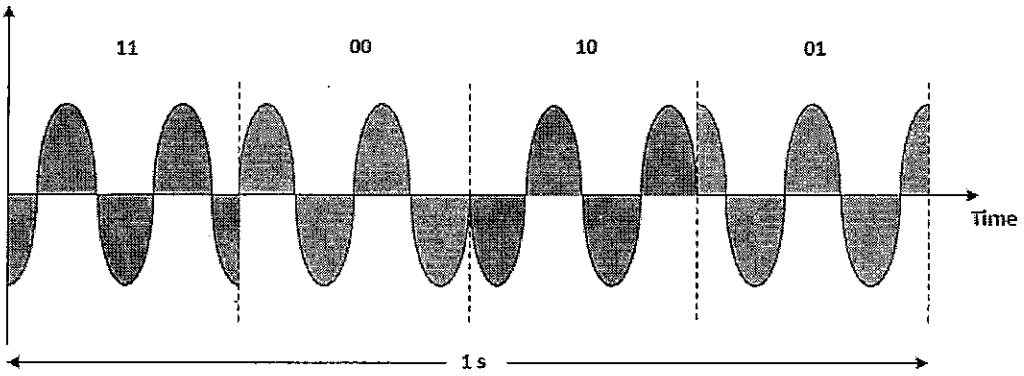

Figure 1

[TOTAL 10 MARKS]

Question 3

a) Assume 10 digital sources are combined using synchronous TDM, each with a bit rate of 50 kbps. Each output slot carries 2 bits from each digital source with no synchronizing bits, answer the following questions:

i. Calculate the size of an output frame in bits. (1 mark)
ii. Calculate output frame rate. (1 mark)
iii. Calculate frame duration. Write your answer in ms. (1.5 marks)
iv. Calculate output data rate. Write your answer in kbps. (1.5 marks)

b) List **TWO** techniques to spread the bandwidth for each station in wireless applications.

(1 mark)

c) State **FOUR** characteristics of unshielded twisted pair (UTP).

(2 marks)

d) Differentiate between radio waves and infrared in terms of frequency, direction and the way of signal travels. Give **ONE** example of radio waves and infrared.

(2 marks)

[TOTAL 10 MARKS]

Question 4

a) Given the received message block is 11010011 and the divisor is 1011. Determine whether the received message block is corrupted by using CRC method.

(3 marks)

Continued...

b) Given the following data unit sizes, calculate the minimum number of redundancy bits to correct one single-bit error:

i. 10 (0.5 marks)
ii. 22 (0.5 marks)
iii. 46 (0.5 marks)
iv. 30 (0.5 marks)

c) Briefly describe the need of error control in data link layer.

(3 marks)

d) Draw the frame format for the following types of High-Level Data Link Control (HDLC) frames:

i. S-frame (1 mark)
ii. U-frame (1 mark)

[TOTAL 10 MARKS]

Question 5

a) Explain on how Carrier Sense Multiple Access (CSMA) nonpersistent strategy works.

(3 marks)

b) Briefly explain **TWO** advantages of wireless LAN.

(3 marks)

c) List **FOUR** reasons the needs to divide one LAN into multiple LANs.

(2 marks)

d) State **TWO** drawbacks of Permanent Virtual Circuit (PVC) connections in virtual circuit switching.

(2 marks)

[TOTAL 10 MARKS]

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